California Environmental Protection Agency

Air Resources Board

EMISSION INVENTORY INFORMER

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Articles from all issues of the *Emission Inventory Informer* can be found on the World Wide Web at http://www.arb.ca.gov/emisinv/informer/inform.htm

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Singapore Trip Sponsored by U.S.-Asian Environmental Partnership

At the request of Singapore's Ministry of the Environment's Strategic Planning & Research Department, the California Environmental Partnership, working through the California Department of Commerce and the United States-Asian Environmental Partnership's (US-AEP) Environmental Exchange Program (EEP), provided two air pollution experts from the ARB to assist the Ministry with ambient air quality monitoring and data analysis. Following is a summary of the report of the visit to Singapore written by Terry McGuire, Chief of the ARB's Technical Support Division, and Bill Oslund, Chief of the ARB's Air Quality Surveillance Branch.

Singapore's ambient air quality monitoring efforts are carried out by the Ministry of the Environment's (established in 1972) Environmental Policy and Management Division of the Strategic Planning & Research Department. The Ministry's current program consists of a network of 15 air monitoring stations, a data telemetry network, and a computerized data management system. The parameters monitored include oxides of nitrogen, carbon monoxide, ozone, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide, total hydrocarbons, wind speed, wind direction, humidity and outside temperature; all of these data are telemetered to the Ministry's headquarters. The data are used to provide daily Pollution Standards Index (PSI) reports to the public and to determine whether the pollutant concentrations exceed health standards.

Singapore's Ministry of the Environment requested ambient air quality monitoring technical assistance to enhance their ozone monitoring program to include ozone precursors and to develop

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SIP/Plan Tracking Project

The Emission Inventory Branch (EIB) is working on a new project to enhance the California Emission Forecasting System (CEFS) to improve the capabilities for tracking the progress of air quality plans in California. The project will be phased in to allow time for software enhancements, testing, and data population which are necessary for successful implementation. Although the emphasis for the project was to develop a tool for tracking progress of the 1994 State Implementation Plan (SIP) for ozone, the system will be an affective planning tool for tracking the progress of any air quality plan. There has been a longstanding need for such a tool, and the districts and ARB will both benefit as a result of the analytical capabilities which are being developed (e.g. the ability to run planning "what-if" scenarios using various control strategy alternatives, performing milestone compliance checks, etc.). Once completed, the system will offer a fully integrated approach for assessing the benefits of state and district control measures.

The air pollution community in California has recognized the need to quantitatively assess the progress of federal and state attainment plans ever since the enactment of the California Clean Air Act (CCAA). Since plan evaluations are emission-based, the SIP (or, more generally, Plan) tracking system needs to be an integrated system which dynamically joins together the base year emission inventory, forecasting, and control rule implementation aspects of the air program. The recent redesign of the ARB's emission forecasting model addressed these needs.

The earlier forecasting model was not capable of linking changes

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USEPA Emission Factor Development -- A Collective Effort

by Tom Pace
U.S. Environmental Protection Agency, Emission Factors and Inventory Group

Uncle Sam Wants You! Well, not really, but we do want your input on emission estimation methodologies. The Emission Factors and Inventory Group (EFIG) in EPA's Office of Air Quality Planning and Standards (OAQPS) recognizes that it can't possibly be "everybody's expert" on each and every industrial process source that emits any of the several hundred pollutants that are regulated by the Clean Air Act. Public involvement in the development of emission estimation methods is essential. Our process for obtaining public input is outlined in Appendix B to the Procedures for Preparing Emission Factor Documents, located on the Internet at http://www.epa.gov/ttn/chief/program.html. Most stakeholders interested in air quality have perspectives and information that are potentially useful in the emission factor development process. We must continue to find new ways to tap into this stakeholder knowledge pool at a time when we are all being "overwhelmed by information."

History - Several years ago we began to tap the collective expertise of the stakeholders through various programs, including the Adopt-A-Factor program, partnerships with industry, and later through the Emission Inventory Improvement Program (EIIP). The EIIP is on the Web at http://www.epa.gov/oar/oaqps/eiip. We have published massive amounts of information on CD ROMs and on the Internet. Moreover, we are exploring ways to enhance stakeholder involvement in the emission factor development process thru better communication and exchange of information. The Internet is the logical medium to facilitate this process.

Our Web Site - The first step is to ensure that stakeholders know when their expertise is needed. Communication is the key to this, and recent advances in technology have made this communication
job easier for all of us! The EFIG has established the Clearing House for Inventories and Emission Factors (CHIEF) Web site to facilitate communication on all aspects of emission factor development for stationary sources of air pollution. It can be found at: http://www.epa.gov/ttn/chief/. It includes the "What's New" Web page that is used to alert users to ongoing activities in EFIG. Communication on EFIG projects is also available through the EFIG List server.

Air Toxics Web Site - Another useful Web site is the Unified Air Toxics Web site http://www.epa.gov/ttn/uatw/. This site contains a link to EPA Rules and Implementation, a Web page that lists all ongoing MACT activity and contact points, complete with E-mail and phone numbers. The purpose of the MACT program is to develop emission standards for hazardous air pollutants under Section 112 of the Clean Air Act (CAA). This page, and the MACT programs described therein, are not the responsibility of EFIG, but the MACT program (which is managed by the Emission Standards Division (ESD) of OAQPS) does seek public input on emissions and emission estimation techniques for programs under Title III of the CAA. The MACT program encourages public participation early in the project. Additional information on the MACT projects can be found in EPA's Regulatory Agenda, published semiannually in the Federal Register.

FYI Page - One additional information sharing tool that we recently established is a new Web page to act as a repository for information developed by EPA or by outside parties which has undergone limited EPA and external review and which EPA feels is potentially useful, but which is not contained in AP-42. Thus, if neither the EPA nor the States have the resources available to conduct the full public review and comment resolution necessary for inclusion in AP-42, the information may, at EPA's discretion, be made available on the FYI Web page for use with appropriate caution. This Web page may be accessed at http://www.epa.gov/ttn/chief/fyi.html.

Related Sites - Information about EPA's mobile source emission models and inventories may be obtained on the Web at the Office of Mobile Sources Web site http://www.epa.gov/OMSWWW. Many States also maintain Web sites for emissions-related activities. For ex-ample, the California Air Resources Board's site can be located at http://www.arb.ca.gov/emisinv/eib.htm.

E-mail Directly to You - The CHIEF List server is an automated E-mail list that users can subscribe to through their own E-mail. Once users have subscribed, they automatically receive any message "broadcast" by the List server to subscribers. Any information placed on the "What's New" page of CHIEF is routinely sent to the List server subscribers. The EFIG uses this method to alert Stakeholders to activities in which they may want to participate. Instructions for subscribing to the CHIEF List server are given below . . . Sign up TODAY! Send an e-mail message to listserver@unixmail.rtpnc.epa.gov. In the body of your E-mail message, type: subscribe CHIEF your-first-and-last-name

Not On-line? - EFIG recognizes that there are some Stakeholders that are not yet "on-line." Thus, we encourage other organizations that write newsletters (e.g., STAPPA/ALAPCO, CARB, trade associations) to include information from the "What's New" page and List server in their newsletters as well. Draft items for public review can be sent by mail upon request if you do not have Internet access. Call INFO CHIEF HELP DESK at (919) 541-5285 if you have any questions.

A Note of Caution About Emission Factors - The AP-42 carries no regulatory stature and users are encouraged to seek out more accurate or more locally specific alternatives. The basis of each factor should be evaluated by the user to ensure that its use is appropriate for a given facility. The CHIEF Web site includes many of these alternative information sources [e.g., the Factor Information and Retrieval System (FIRE), the FYI page mentioned above, Locating and Estimating (L & E) docu-ments]. Also, the use of material balances, Continuous Emissions Monitoring (CEM) or stack tests at similar facilities may be more appropriate.

This article is reprinted from the USEPA's Spring '98 CHIEF Newsletter.

1997 Southern California Ozone Study-NARSTO: Preparation of the 1997 Gridded Emission Inventory

The 1997 Southern California Ozone Study-North American Research Strategy for Tropospheric Ozone (SCOS97-NARSTO) is intended to provide a milestone in the understanding of relationships between emissions, interbasin transport, and ozone standard exceedances, as well as to facilitate planning for further emission reductions needed to attain the National Ambient Air Quality Standards (NAAQS). Accurate day-specific emission inventories are a crucial element for characterizing air pollution episodes and optimizing the performance of air quality models used to analyze the data collected during SCOS97-NARSTO and develop strategies for attaining the NAAQS.

Historically, modeling emission inventories have been criticized for using incomplete day-specific data and for lagging behind the other data (meteorological, air quality) collected in air quality studies. To address these issues, an interagency team consisting of staff from the ARB, local districts, USEPA and the US Navy was formed to develop what we believe is the most comprehensive collection of day-specific emission information for a large study domain (80,000 mi^2).

To make a modeling inventory available in a shorter time frame, a two-phased approach to the development of the modeling emission inventory was adopted which will provide modelers with a "fast-track" inventory for preliminary modeling (Phase 1). This will be followed by a more detailed "final" modeling emission inventory which incorporates all of the day-specific information collected during the field study (Phase 2).

Data to calculate day-specific emissions were collected: 1) for major stationary sources in southern California; 2) from traffic counters on major southern California state highways; 3) from certain off-road mobile sources; and 4) for wildland/forest fires. A spatial and temporal activity information database will be developed for aircraft operations within the study domain. The main objective of this study is to develop a spatially and temporally (including day-specific inventories for weekdays and weekends) resolved inventory of emission estimates of TOG, NOx, SOx, PM, and CO from anthropogenic and certain non-anthropogenic sources. The 1997 gridded emission inventory will have a resolution of 2 km.

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SIP/Plan Tracking Project

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in the emission inventory to control rules. The need for this capability was the impetus for the recent redesign of the system. In addition, the forecasting program needed to be redesigned to make it fully compatible with the California Emission Inventory Development And Reporting System (CEIDARS). The redesign project was a three year joint effort between the staffs of ARB and California State University Fullerton. CEFS features a rule tracking component, a revised growth activity data module, a new temporal module, and completely revamped forecasting logic—CEFS was placed into operation in March of this year and will serve as the core system for this project.

Because the basis for plan progress is emission-based, the first phase of the project will address the system enhancement requirements necessary to analyze emission reduction progress, and develop and implement a data collection and management plan for control measure data. The preliminary plans to enhance the system's versatility will include a modification to the rule tracking system by adding a component to track plan commitments; and developing improved emission analysis reporting capabilities. As districts begin using the system, particular enhancement needs will arise and will be implemented as appropriate. With CEFS now in production, districts can begin using CEFS immediately. However, all prior control profile information --based on ARB's statewide control categories-- is now obsolete. Therefore, comprehensive control data sets need to be constructed based on rules to replace the former control profile data sets. In the first phase of the project, EIB staff will begin working with districts based on the level of interest and need. The first districts utilizing CEFS will also have the opportunity to serve as prototypes for the SIP tracking enhancement project.

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Singapore

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a suitable forecasting model for ozone to help track ozone precursor emissions, and to refine their control strategies to improve Singapore's air quality. Specifically, the Ministry wanted information on developing a comprehensive network of photochemical assessment monitoring stations (PAMS), including the required equipment, station locations, sampling frequency, and the type of expertise and staff resources required for data collection and interpretation to determine the sources of ozone precursors and to forecast ozone levels.

The discussions began with a demonstration of the Ministry's ambient air quality monitoring data acquisition system. The system displays time plots of aerometric data (ozone, carbon monoxide, nitrogen oxides, sulfur dioxide, PM_{10}, wind speed and direction, and temperature for the 15 monitoring stations the Ministry operates). The computer system also includes modules for dispersion modeling, emissions, and other features.

Based on limited observations of data and discussions with our hosts, we learned that ozone concentrations rarely exceed the US national ambient air quality standard of 0.12 ppm by volume for one hour, and nitrogen dioxide and carbon monoxide concentrations are consistently very low. Sulfur dioxide concentrations typically remain below the US national ambient air quality standards of 0.03 ppm by volume as an annual average and 0.14 ppm by volume as a 24-hour average, but concentrations sometimes come close to those standards. PM_{10} concentrations are typically less than 100µg/m^3 as 24-hour averages (less than the national standard of 150 µg/m^3), but during certain times of the year, these concentrations reach several hundreds of µg/m^3. These high fine particulate matter concentrations, which appear to be Singapore's only serious air pollution problem, are the subject of widespread complaints from the public; the problem is referred to as the *regional haze problem*. Typically, this haze is present in conjunction with the southeasterly, monsoon winds which pass over Indonesia. It is generally believed that wildfires in Indonesia (often, fires that are set in forests for cultivation) are the cause of this problem in Singapore. All evidence we were shown corroborates that explanation.

If the haze problem is, indeed, transport from Indonesia, abatement of that problem will be extremely difficult. However, we believe there are measures that can be taken to ameliorate the problem. First, a sound transport investigation to clearly establish the source of this problem would help to mollify the many concerned citizens. Often, smoke or haze impacts of only a few hours duration are not well reflected in 24-hour fine particulate matter monitoring data. A four hour excursion of haze which might have fine particulate matter concentrations of 500 µg/m^3 in conjunction with a 20-hour period of clean, marine air could result in 24-hour average concentrations of 100 µg/m^3 . When the public hears that the air was fairly clean during a day when visibility was less than a city block for several hours, they may question the measurements. The ministry should attempt to address this. Finally, even though the Ministry may be powerless to deal with the source of the haze, we recommend that they explore the feasibility of deploying monitoring equipment between Singapore and Indonesia to attempt to provide reliable, advanced warning to the citizens that a *haze attack* is on its way.

Other discussions centered on emission inventory, modeling, and air monitoring. Mr. McGuire discussed selected emission inventory and modeling topics with Research & Development staff, while Mr. Oslund discussed the air monitoring site visits with Laboratory and Monitoring staff.

Our trip to Singapore gave us a good understanding of the Country's air quality program, but future visits to see how our recommendations were dealt with, could be very valuable to them. Additionally, visits from the Singaporeans to train on ambient air monitoring for toxics and/or NMOC, and emission inventory and modeling could be provided by the ARB. Finally, there are numerous, local consultants specializing in these areas. The US-AEP can provide the Ministry with that information.

Electronic Data Interchange Prototype

In April 1998 the Air Resources Board Emission Inventory Branch, along with the USEPA and the Pennsylvania Department of Environmental Protection, participated in a prototype demonstration of an integrated Electronic Data Interchange (EDI) system. Using only personal computer software and specialized translation software, a small amount of point source data was successfully uploaded from the ARB to the USEPA and placed in a USEPA database.

Although an increasing amount of California's emission inventory data is being managed and transferred electronically, problems of inconsistent, incomplete, and inaccurate data persist. Within California, the Air Resources Board uses proprietary electronic formats to transfer data from facilities to districts and from districts to the ARB. Because facilities, districts, and the Air Resources Board all have a common understanding of how emission inventory data is structured, this approach works fairly smoothly.

At the national level, however, various organizations, including local agencies, states, and the US EPA, all have different understandings of how emission inventory data should be organized. This makes transfer of emission inventory data difficult at best. To remedy this situation, the data that is collected and

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Air Toxics "Hot Spots" Fee Regulation for fiscal year 1998-99

The Emission Inventory Branch (EIB) staff is currently at the mid-point in the development of amendments to the Air Toxics "Hot Spots" Fee Regulation for fiscal year 1998-99 Fee Regulation (Fee Regulation). The EIB staff has had four meetings with the Fee Regulation Committee to discuss issues associated with the Fee Regulation. The Fee Regulation Committee is made up of staff from the Air Resources Board (ARB), the Office of Environmental Health Hazard Assessment, and the districts.

Final facility program data, used to calculate Program fees and the districts' allocation of the State's "Hot Spots" Program costs, are due to the EIB by July 1, 1998. Districts must also supply emissions inventory data to verify a change in a facility's fee category. That data is due to the EIB by July 15, 1998.

The EIB staff will be conducting a set of public workshops on Tuesday, July 21st and Thursday, July 23rd. The workshop on the 21st will be held in the Board Hearing Room of the ARB in Sacramento. The workshop on the 23rd will be held in the auditorium of the Annex 3 Building of the ARB's El Monte offices.

After the workshops, EIB staff will be preparing the Initial Statement of Reasons for Proposed Rulemaking for the proposed amendments to the Fee Regulation (staff report). The staff report will be published and distributed in early September and proposed amendments to the Fee Regulation will be presented to the Air Resources Board on Thursday, October 22, 1998, in Sacramento.

In an effort to inform the stakeholders in the Program, EIB staff has organized a working group comprised of members of the regulated community (industry) and environmental group representatives. The EIB schedules teleconference calls with the stakeholders group to discuss the development of proposed amendments to the Fee Regulation. For more information on joining the stakeholders group and participating in future conference calls, please contact Kirk Rosenkranz at (916) 322-7673; e-mail krosenkr@arb.ca.gov.

Electronic Data Interchange

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shared between organizations must be standardized. The Emissions Inventory Improvement Program (EIIP), a co-sponsored effort by the USEPA and State/local agencies, has developed a prototype EDI system to demonstrate the steps needed to create, transmit, and maintain a standard set of air emissions data between two States and the USEPA using a non-proprietary data transfer standard.

To achieve this standardization, the EIIP Phase I Data Model was developed to identify a a common understanding of a core set of air emission inventory and modeling data. Once the data model was documented, the American National Standards Institute (ANSI) X12 EDI standards were adopted as the common data transfer mechanism. Use of the ANSI X12 standards allows both the sender and the receiver to maintain their own completely independent data management systems. Although all participants in the prototype used the same translation software, this is not strictly necessary in general practice.

In order to transfer data from California to the US EPA, ARB staff had to write specialized application program interface (API) software to act as a bridge between the Calfornia Emission Inventory Development And Reporting System (CEIDARS) II database and X12 translation software residing on a personal computer. At the ARB, the API extracted data from CEIDARS II into a standard data file dictated by the X12 translation software. On the data was translated into X12 format, the data was then sent via modem to an EDI translator at USEPA where it was retranslated back into a standard data file. This file was then read by an API at USEPA which loaded the data into the receiving database.

The ARB expects to use this X12 EDI data transfer technology in the near future as the preferred mechanism for submitting its annual emission inventory to the US EPA.

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The Emission Inventory Informer is published by the Emission Inventory Branch, Technical Support Division, California Air Resources Board, with occasional contributions from other staff at the ARB. Inquiries should be addressed to:

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